

showing typical symptoms, may be diagnosticated as rōtheln with a fair degree of confidence.

5. In sporadic cases, where neither measles nor rōtheln has been experienced, a diagnosis of probable measles or rōtheln must be made, accordingly as the symptoms and course resemble the type of one or the other affection.

A final word of explanation and defence of the title under which this paper appears, is due. Most unfortunately the term *rubeola*, which in Germany, since the time of Hildebrandt, is universally adopted as the classical name for our affection, is to English-speaking races inseparably connected with the conception of measles. This has driven English-speaking writers to have recourse to the German word rōtheln. To one unacquainted with the German language, this title is unmeaning, is not euphonious, and is a source of embarrassment. First employed by Werlhof, in 1759, it is now firmly established and definitely understood in Germany. Unable unqualifiedly to adopt "rubeola" and "rōtheln," the medical public has hit upon "German measles" as designating the malady in question, and under this name it is becoming generally recognized. Yet this is a most unsatisfactory and unscientific evasion of the real issue, and implies a relationship which is not admitted. I would suggest, therefore, that the title first proposed, I believe by Veale, and afterward by Squire, and adopted in Quain's *Dictionary*, *rubella*, be accepted as the prime name of the affection; and as "German measles" is manifestly a most objectionable designation, I also suggest that the affection be popularly known as "epidemic roseola," a term that has the advantage of age, and that was undoubtedly originally applied to it, though under a different conception of its nature.

19 CATHEDRAL STREET.

ON SOME FORMS OF ALBUMINURIA NOT DANGEROUS TO LIFE.

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THE gravity of albuminuria as a symptom has been differently estimated at different times. It is not much more than a hundred years since Cotugno discovered the fact of its occurrence, and not much more than fifty years since Dr. Bright made out the relationship between it and the diseases of the kidneys which came to bear his name. For a long time after his discovery the utmost dread of the occurrence of the symptom existed in the mind both of the profession and the public, most people regarding its existence as unfailing evidence of grave organic

disease. But gradually it has come in recent years to be known that albumen often appears in the urine, even in considerable quantity and very persistently, in persons free from important organic malady. Indeed, it may be maintained that some patients with persistent albuminuria are yet eligible for life insurance at little, if at all, above ordinary rates.

It is important to know the characteristic features of these non-dangerous albuminurias. But they are so numerous, and require such careful discussion, that I could not do them justice in a single paper. I must, therefore, meanwhile set aside several varieties. Thus, I shall not take up the group which may be called accidental albuminurias, in which the albumen is accounted for by the admixture with blood, pus, spermatic or prostatic fluid. Neither shall I discuss the albuminuria associated with infective processes and high temperature, which is often seen in pneumonia, erysipelas, diphtheria, and the specific fevers. Nor shall I consider the albuminuria attending upon various nervous disorders such as exophthalmic goitre, epilepsy, and apoplexy, nor such forms as that which Claude Bernard produced experimentally by puncturing a point in the floor of the fourth ventricle. Nor shall I dwell upon the albuminuria which Dr. George Johnson has found to be so often induced by the health-giving exercise of cold sea-bathing. Nor, lastly, shall I speak of the form due to passive congestion from cardiac disease or vascular obstruction.

Such groups as these having been put aside, at least four categories can be defined, which, although they run into one another and mutually overlap, perhaps varying in the same individual from time to time, may yet with advantage be distinguished. These are, 1st, paroxysmal albuminuria; 2d, dietetic albuminuria; 3d, albuminuria from muscular exertion; and, 4th, simple persistent albuminuria.

I do not know whether this classification will ultimately turn out the most satisfactory, but I shall certainly be able to illustrate each of these varieties with cases markedly characteristic. In a few words I may explain the substance of what I deem the most important contributions to the subject in recent literature. Many years ago Sir Robert Christison pointed out that the use of certain articles of diet and luxury sometimes induces temporary albuminuria. Jaccoud¹ formulated the statement that there are cases of persistent albuminuria in which the patient is substantially in good health, and in which there is no kidney disease. He therefore distinguished between persistent albuminuria and albuminuria from Bright's disease. Dr. Moxon² gave definiteness to our ideas by his paper, published in 1878, on chronic intermittent albuminuria. He divided cases of this kind into two classes: 1st, the albuminuria of

¹ *Nouv. Dict. de Méd.*, i., Paris, 1864. Quoted in *British and Foreign Medico-Chirurgical Review*, April, 1868, p. 325, etc.

² *Guy's Hospital Reports*, 1878, vol. xxiii., 3d series.

adolescents, in which the symptom continues during a long period in a desultory and irregular way, so that in some it is rather occasional than intermittent; 2d, remittent albuminuria, in which the albuminuria is in greater quantity and occurs more constantly from day to day, especially in the urine passed after breakfast, but is usually wanting in that passed in the early morning. He further divided these remittent cases into two groups, in one of which there is renal disease, in the other none. With regard to the albuminuria of adolescence, Dr. Moxon pointed out that it is a state of health to which young men are subject, which from its frequency deserves a special name. The patient is out of condition, listless, and languid, sleeps too much, and yet rises unrefreshed, is anæmic, and gray and sunken about the eyes. It is simply a state of debility without any organic disease. The urine is found to be at times albuminous—most often after breakfast, while at other times it is quite free from albumen. He had met with nineteen cases of it, and of the seven cases he records two pairs of them were brothers, while another brother in one of the families affected was under his care with a different urinary abnormality—the persistent presence of a large excess of urea. This paper, as I have said, defined our knowledge, but that the existence of non-dangerous albuminuria was an idea familiar to acute physicians may be shown by the fact that Sir William Gull had told Dr. Moxon that in his experience albuminuria is almost as common in young and growing men and boys as spermatorrhœa. Dr. T. Morley Rooke¹ drew attention to the remarkable effect of rest in the recumbent posture in removing or keeping in abeyance the albuminuria of adolescence, and Dr. Burney Yeo² dwelt upon the importance of muscular exercise as a cause, and of rest in bed and the effect of food and wine as means of lessening the albuminuria.

Dr. Clement Dukes,³ discussing the albuminuria of adolescence on the basis of his experience as physician to Rugby, pointed out that it is extremely common and presents a great variety of features, both in its causation and special characters. Sometimes a sudden change in temperature, sometimes an error in diet, sometimes excessive exertion, sometimes mental emotion induces it. He showed that sometimes the diet has no effect, at others the most marked, so that a patient who has no albuminuria when taking milk may get it when he adds a little bread to his diet, and one who, going about, requires to limit his food in the strictest way, can eat and drink freely if he remains in bed. It may be persistent for a very long time or it may disappear and reappear; it may be absent at one time of the day and present at another.

I shall not detail anything of the important contributions of Mahomed,⁴

¹ British Medical Journal, 1878, vol. II. p. 596.

² Ibid., Nov. 30, 1878, p. 794.

³ Ibid., 1878, vol. II. p. 627.

⁴ Lancet, Jan. 18, 1879, p. 77.

Fürbringer,¹ Runeberg, Saundby,² Leube,³ George Johnson,⁴ Quain⁵ and Semmola,⁶ and Stanley Rendall,⁷ but pass at once to a communication by Dr. Pavy,⁸ made at the British Medical Association meeting in 1855, in which he suggests the name cyclic albuminuria and gives interesting details of a number of cases. He describes the diurnal appearance and disappearance of the albumen very much as Dr. Moxon did. There may, he says, be considerable variation in the amount of albumen on different days. It may go on for weeks, months, or years, without impairment of health. There may be sharp, unduly forcible cardiac impulse, but the pulse is soft, not hard and sustained. There is nothing, he says, to show that it is an early stage of Bright's disease or that it leads to any serious disorder. The urine is otherwise normal as a rule, with no casts, but occasionally sugar has been detected, while oxalate of lime crystals are frequently present. The age of patients observed varied from nine to forty-nine. Three cases were in children aged nine, eleven, and thirteen respectively, two boys and one girl. Dr. Pavy offers no theory, but compares the condition with some analogous phenomena of a diurnal character. Thus in the phosphatic diathesis the urine may be normal in the early morning, whilst for a few hours after breakfast it is turbid from the presence of phosphates, becoming clear again in the afternoon and remaining so till after breakfast next day. There is also a diurnal variation in the temperature of the body. Thus a physiological cyclic change exists of which other illustrations could be adduced. This paper has given fresh impetus to the study of these cases.

Dr. Maguire,⁹ in an able and interesting communication, has suggested that we may recognize three classes of functional or cyclic albuminuria: 1st, those accompanied by general languor, low tension pulse, and no deposit of uric acid in the urine; 2d, those with robust health, pulse of high tension, frequently some dyspepsia, and a copious deposit of uric acid; 3d, rare cases in which some abnormal albumen is present in the urine.

Having thus given an idea of some of the chief recent observations on this subject, I proceed to describe and illustrate our four varieties.

I. *Paroxysmal Albuminuria*. I shall perhaps best convey an idea of the features of this form of albuminuria if I describe a typical case which I studied in the wards of the Old Infirmary. A young woman

¹ London Medical Record, 1880, pp. 449 and 450.

² British Medical Journal, May 10, 1879, pp. 699 and 700, and June 5, 1880, pp. 841-843.

³ Lancet, 1878, vol. i. p. 501; 1881, vol. i. p. 468; and Medical Times and Gazette, Nov. 9, 1878, p. 546.

⁴ British Medical Journal, Dec. 13, 1879, pp. 928-930.

⁵ Lancet, Jan. 18, 1879, p. 86.

⁶ Ibid., Oct. 18, 1879, p. 583.

⁷ Étude sur l'Albuminurie alimentaire, Thèse pour le Doctorat en Médecin, Paris, 1883.

On Cyclic Albuminuria, British Medical Journal, Oct. 23, 1885, p. 789.

⁹ Lancet, June 5, 1886, p. 1062, and June 12, 1886, p. 1106.

was admitted on account of acute illness. She had general *malaise*, some degree of fever, and gastric catarrh, but on examination, nothing further could be discovered amiss excepting that the urine was rather scanty, dark in color, and was loaded with albumen. The microscope showed tube casts in great number and of several varieties—epithelial, granular, and hyaline. There were also some crystals of oxalate of lime. There was a degree of puffiness of the face, but no dropsy, and, notwithstanding the urgency of the renal symptoms, I ventured to express the opinion that the illness would prove transient and unimportant. My reasons for so doing were the suddenness of development of the renal symptoms and the discrepancy between them and the general condition of the patient, and the opinion was further confirmed when it transpired that similar attacks had previously occurred and had speedily passed off. The next day the patient was much better; the albumen was disappearing, the tube casts were no longer so numerous, and before many hours had elapsed she was quite well.

This form of albuminuria stands in very interesting relationship to what is called paroxysmal hæmatinuria or hæmoglobinuria, a disease which is ascribed by many to a morbid action of the liver. The patient in the intervals between the paroxysms may appear to be in good health. The attack begins with a slight feeling of chilliness, or a rigor attended by some uneasiness in the region of the liver and in the small of the back. The urine is of a dark color, due to the presence of blood pigment. As a rule, the color is due simply to hæmoglobin, but sometimes blood corpuscles may be detected in the freshly passed urine. They, however, even when present soon break down, and the blood pigment is liberated. There is, therefore, in this disease a hæmolytic process, a destruction of red blood-corpuscles probably due to some temporary derangement of the liver, and the liberated pigment is discharged by the kidneys. A single micturition may discharge all the hæmoglobin which has been set free, or it may appear during two or three micturitions. Now I think I may more clearly bring out the close relationship which exists between this disease and that which I have called paroxysmal albuminuria, by relating a case described by Rosenbach.¹

A little boy, seven years old, after a severe fall from a wagon, became subject to attacks of periodical hæmoglobinuria. The attacks occurred pretty frequently, and exhibited the features common in the disease. The most interesting point for our present purpose is that at the beginning of each attack, before the hæmoglobin appeared, the urine became albuminous. This is by no means an exceptional circumstance; indeed, it will be found in many cases of hæmoglobinuria. It is probable that the

¹ Quoted in London Medical Record, 1880, p. 450.

process originates either in the nervous system, inducing a morbid action of the liver, or in a primary affection of that gland; and that it causes blood changes which irritate the kidneys, giving rise to a transient inflammatory action during the process of elimination of the waste products. Whether this view of the pathogenesis of the process be correct or not, the clinical relationship of hæmoglobinuria to the form of albuminuria we are now discussing is unmistakable. The relationship is rendered the more distinct by their etiology, for, like those of paroxysmal hæmoglobinuria, the attacks of paroxysmal albuminuria are apt to be brought on by cold and wet, sometimes by errors of diet and alcoholic intoxication.

The characteristic features of this group of cases are easily recognized. The sudden and copious occurrence of albumen in the urine with numerous casts, the process lasting only a short time and recurring at intervals with or without a perceptible exciting cause, will justify you in diagnosing the condition.

What view are we to take as to the explanation of the process? Is it to be referred to changes in the secreting structures, in the bloodvessels, or in the blood itself? Considering that we have so marked a discharge of casts and epithelial cells, it is obvious that we must admit changes in the secreting structures. Alterations in the blood pressure may exist, but only as a secondary element. Changes in the blood itself, although not demonstrated, are, in my opinion, extremely probable, and they most likely induce the alteration in the kidneys. Irritation of the kidneys from blood changes is a very common phenomenon. It must frequently have been noticed how, in cases of many varieties of jaundice, albumen, and tube casts appear in the urine, and this evidently as a result of irritation of the kidney by the products of the hepatic disorder. In cases of oxaluria a similar change, probably depending upon a corresponding cause, has been noticed. The analogy with the hæmoglobinuria process supplies another consideration in favor of the view. Thus is clearly seen the hypothetical explanation which at present commends itself to my judgment.

If this view be correct, it is obvious that our treatment in such cases should be directed, on the one hand, to the avoidance or diminution of renal irritation, and on the other, to the regulation of the hepatic function and of the chemical processes in the body. Happily, the attacks are usually of brief duration, and I have never known them prove permanently injurious. The chloride of ammonium is the remedy in which at present I put most confidence. It must, of course, be given with due regard to the avoidance of renal irritation.

II. *Dietetic Albuminuria* is a variety which has long been more or less distinctly recognized. Some people suffer from it whenever they indulge in certain articles of diet. In some cases one kind of food, in others

many require to be proscribed ; cheese, pastry, and eggs are among the more common offenders. My first experience of such cases was obtained when I was resident in the Infirmary. A member of the staff used sometimes to make his appearance with a pasty, puffy condition of eyelids, and he found that this was associated with albuminuria. His albuminuria proved to be dietetic. If he indulged in even a moderate amount of cheese or of pastry the symptom was pretty sure to arise. Such a passing and temporary albuminuria always and exclusively following upon error of diet is easily made out and avoided. On the other hand, there are some cases in which the albuminuria is little, if at all, determined by the kind of food, but the entrance of food of any sort into the stomach suffices to induce the symptom ; and there are many in which the food determines the occurrence of albumen, and in which, nevertheless, some other factor plays an important part in its production. In dietetic albuminuria we must, therefore, recognize at least these three factors as possible exciting causes : first, the use of certain kinds of food ; second, the entrance of food (of any kind) into the stomach ; and, third, one or both of these, in association with other influences, such as exercise or time of day. It will be readily gathered from the examples to be described, that each of these factors has very different amount of influence in different cases, the symptom being almost entirely due to one in some cases, to another in others.

I shall illustrate this variety by a negative and a positive instance. A gentleman consulted me some years ago on account of albuminuria. and when I was searching for the cause it transpired that his dietetic habits were such as might well have accounted for the symptom. He was accustomed to a luxurious table, and acknowledged a special partiality for cheese. I asked him which were his favorites. He named Stilton, Rochefort, and Gorgonzola. I inquired as to the quantity, and he indicated an amount three inches long, an inch and a quarter broad, by at least an inch thick. I expected that this would prove to be an important causal element in his case, and after various other experiments I directed him to take a good piece of one of his favorite cheeses, but found that no albuminuria existed. Indeed, I found that diet had little or no effect upon his urine. On testing it after dinner on one occasion I found that, although the meal had included a good allowance of *pâté de foie gras*, chicken croquets, roast pigeon, with spinach, gooseberry tart, and a pint of Marcobrunner, the urine was normal. On another occasion, when a Welsh rarebit constituted part of the meal, a like result appeared. I found also that a breakfast of fried sole, a cup of coffee with milk, and a pint of milk with bread did not produce albuminuria, and a sumptuous luncheon was alike inoperative. The only food which seemed to induce the albuminuria was new hot bread. Thus, it was clear that my first impression was wrong, and that the albuminuria

in this case was not of dietetic origin. I shall show further on what its cause really was.

I shall now refer to a case in which a positive effect was apparent. The patient, then a medical student, called upon me first in the autumn of 1881, complaining of headache and dyspepsia. The heart's action was not satisfactory, but gave no indications of structural change either in the organ itself or in the kidneys. There was distinct, although not copious, albuminuria, unattended by tube casts or other token of organic renal disease. I ordered him a mixture containing chloride of ammonium and tincture of perchloride of iron. In the course of a week the albumen had diminished to a faint trace, and by the end of a fortnight it had disappeared entirely. It did not recur until the following summer, when his vigor was reduced, owing to the work for the final examination and to anxiety in connection with the death of his father. It was then observed that, although not present in the morning urine, there was a distinct trace directly after food entered the stomach. The rapidity of its onset was very remarkable. As soon as food of any sort was taken albumen began to be discharged by the kidneys. Being by this time a well-educated medical man, he was much interested in this circumstance, and found by experiment that if after commencing a meal he passed a little water, it was sure to be albuminous, although that passed a few minutes before was not. But in this case the symptom was influenced by the season of the year and the time of the day. It occurred only in summer and, while easily induced in the morning or at midday, it never appeared during the evening or at night. It had its special periods, but even during them the ingestion of food was the determining element. The breakfast and the midday meal always produced it, but never was a trace discoverable in the evening, whatever food was taken. The nature of the diet had at all times very little effect. If he lived upon rich food the albuminuria became no worse. If he made Revalenta Arabica and such like substances, his diet, it appeared all the same. Even a milk diet seemed to produce no favorable effect, but he could not persevere in its use, as it did not suit him.

The results of exercise were carefully tested. They were found distinct, but much less marked than those of food. If he fasted of a morning, no amount of exertion induced the albuminuria. But if, when the albuminuria had been induced by eating, he took exercise, its quantity at once greatly increased. On the other hand, as with food, exertion failed to produce it during what I may call the non-albuminuric portion of the twenty-four hours.

There never were any tube casts, but oxalates were frequently present. The urine was occasionally high colored, never bloody, sometimes deposited urates, but never uric acid. He never had pain in the back or other local symptoms to draw his attention to the renal functions.

The albuminuria has recurred each summer till this year, but in 1885 it was very slight, and this year has passed as yet without its appearance. The last specimen of urine examined was natural in color, specific gravity while warm, 1.020, distinctly acid, and contained no albumen or sugar. The condition of the heart is the same as it was in 1881. The state of the vessels is also the same as before, with perhaps a little increased tension. The walls of the radials are distinctly thickened. When the albumen was present there was always, he says, some intermission of pulse, but this has continued during the last year although the albumen has been absent.

By way of treatment, various plans were tried. Arsenic failed entirely. Iron produced little benefit. Spinal douches of cold water falling from a height of eight feet did much good. But, on the whole, nothing proved so serviceable as the combination of iron with chloride of ammonium.

Summing up the facts ascertained in this case we find—

1. That albuminuria occurred only after ingestion of food.
2. That it occurred in summer and at certain periods of the day, viz., after breakfast and after the midday meal—never before breakfast or in the evening.
3. That its onset was sudden, setting in as soon as food reached the stomach.
4. That the nature of the diet appeared to have little or no effect.
5. That exercise had a decided effect, but only secondary to that of food.
6. That the albuminuria was worse after mental excitement.
7. That cold douches applied to the spine checked, while cold sitz and Turkish baths (without the cold douche) increased the albuminuria. If, however, he took either a Turkish or a cold sitz bath in the morning when he had no albuminuria, neither of them produced it.
8. That counter-irritation to the loins by mustard or croton oil did not at all diminish the albuminuria, but rather increased it.
9. That, as regards medicines, arsenic had no effect, and while iron proved slightly beneficial, chloride of ammonium was much more efficient.

The first question which arose as to diagnosis in this case was whether Bright's disease existed or not. The state of the vessels, in respect both of their walls and tension, might have corresponded to this, and the heart's action was such as one sees occasionally in renal cases. But there had never been a trace of dropsy, there were no tube casts, the specific gravity was good, and the albuminuria came and went. Therefore, there was manifestly no inflammation of the tubules. The quantity of the urine, the specific gravity, and the absence of consequent complications, such as the retinal changes, excluded a diagnosis of cirrhosis,

while there was no polyuria, or any causal or concomitant complications fitted to suggest waxy disease. It was also certain that the albuminuria was not an accidental result of disease of the urinary tract. I therefore concluded that it belonged to the category of unimportant albuminurias and gave from the first a correspondingly favorable prognosis. It was only later that all the facts which I have mentioned became known to me, and now, surveying them, it is clear that we have to do with a form of albuminuria mainly dietetic, although influenced in an important measure by season and time of day, and in a minor degree by exercise.

Deferring what I have to say regarding the causation of dietetic albuminuria, I must express the wish that I could throw definite light upon the curious annual and daily cycle observed in the case—not a cycle of albuminuria, but a cycle of capacity for dietetic albuminuria. With our present knowledge, speculation on this subject is, however, not profitable.

This patient's constitution is peculiar, combining a marked nervous excitability with a tendency to hepatic derangement. He is liable to mental depression—often suffers from what he calls an ill-defined dread. His complexion is sallow, especially during what he terms his bilious attacks. These are attended by general malaise, headache, catarrh of stomach, irregularity of bowels, and functional disturbance of the liver. He is greatly impressed with the value of chloride of ammonium in the treatment, not only of his renal, but also of his nervous symptoms and his digestive disorders.

In order, then, to clear up the diagnosis in a case of supposed dietetic albuminuria, it is necessary to experiment with various articles of diet, and watch the result.

What explanation can we offer of this form of albuminuria? Obviously it cannot be due to primary change in the secreting tissue, for, although albumen may be very copious, there is no discharge of tube casts or renal epithelium. A chemical alteration of the albumen of the blood, or of its condition in this respect, naturally suggests itself. In regard to the point of these suppositions, however, it must be noticed that it is ordinary serum albumen that is effused, and not, so far as I have seen, any special form. I admit that there may be an undue tendency to the formation of acid albumen or alkali albumen, but this is certainly not the rule. One can understand how, with faulty chemical processes within the body, digestion of nutritive substances and transformations of albumen might be abnormally altered, and albumens more capable of transudation produced, but of the real existence of such a process I know of no sufficient evidence. The excretion of more diffusible forms of albumen, such as propeptone and peptone, is, of course, known to be of not infrequent occurrence, and it may, in some

cases, be related to digestion, but at present we are studying cases in which the ordinary forms of albumen—serum albumen and paraglobulin—are met with.

Apart, however, from any problematic change in the nature of the albuminous constituents of the blood, we have to consider the second stage positively. It is definitely known that changes in some of the other blood elements exert a marked influence upon the filtration of the ordinary forms of albumen. Hoppe-Seyler and others¹ have shown that the quantity of albumen which passes through a filter increases with the increase of the saline constituents. Chloride of sodium is the most efficacious, but nitre, chloride of calcium, and even urea, exert a certain influence. We can readily conceive that, after a meal, the salts of the blood may be increased; it seems possible that this very transudation of the albumen may be induced. The whole question of the influence of salts on the circulation is very interesting. If the attempt be made to pass fluids of various kinds through the vascular system of the kidneys of animals recently killed, it must be granted that it is much easier to pass one rich in salts than simple water. But to this subject I shall allude more in detail on another occasion, and I would say, meanwhile, that, although the fact as to diffusion is well established, its applicability in the explanation of these cases is not yet demonstrated.

While, however, giving these suggestions toward chemical explanations due weight, I cannot but advert to the possibility of reflex vascular influence being at work. We may conceive that, on the entrance of food into the stomach, the terminations of the vagi may be morbidly influenced, or that the nerves supplying the renal vessels respond abnormally to a normal peripheral impression. I have already accentuated the fact that the friend, whose case I have last described, says that as soon as food reaches his stomach the albumen appears, and that the nature of the food ingested makes no difference. One can scarcely suppose that sufficient time has elapsed for absorption, chemical alterations, and excretion, and it seems reasonable to suspect that an influence exerted on the vessels through the nervous system would have more chance of bringing about the result within the time. While throwing out these suggestions, I must admit that our present knowledge does not suffice to afford a satisfactory explanation.

As to the treatment, there is little to be said excepting that such patients must not only be careful as to diet, but scrupulously attentive to all hygienic laws; and that certain remedies, such as the chloride of ammonium or arsenic, may prove eminently serviceable. I should advise looking carefully for evidence of faulty digestion due to defects of different glands subserving the process, and ascertaining whether we can

¹ Senator on Albuminuria, New Sydenham Transactions, pp. 97-98, 1884.

discover disorder in the stomach, the duodenum, the liver, the pancreas, or the small intestines. It may be found that only one of them is at fault, and remedies may be applied accordingly. Further, what I have said will suggest the thought that in some cases there may be, not only a digestive, but a nervous influence at work, and that the latter may actually be the main factor in the case; this also may serve as a guide in determining the treatment.

III. I shall now illustrate *albuminuria following upon muscular exertion*, and shall describe its features by narrating a case at present under my care. The patient is a girl, thirteen years old. A sample of her urine, passed on rising at 7.30 A.M., when tested with nitric acid, is seen to contain no albumen, or only the very faintest trace. But the urine passed an hour later, after dressing and moving about the house, but before any food had been taken, is highly albuminous. Thus the getting up is followed by this extraordinary and marked albuminuria. The history of the case is as follows: Her previous health is reported to have been good. About last Christmas, while at a boarding-school, she had an attack of diphtheria which is, like scarlatina, a not uncommon cause of albuminuria by the production of inflammatory Bright's disease. She, however, did well, and went through the whole illness without a trace of albumen appearing in the urine. I can say so with confidence, as I know that particular care was taken in regard to its examination. When, however, she was convalescent, and was getting up and going about the house (but not getting out), albumen was detected. This does not correspond to the ordinary clinical history of albuminuria connected with diphtheria. As a rule, it appears during the attack, or on exposure to cold, within a few days of its subsidence. My own experience in this matter is confirmed by that of others. Dr. John Abercrombie,¹ for example, says that while he has seen it occur within twenty-four hours of the first symptoms of diphtheria, he has never seen it commence later than the tenth day of the disease. During January, a few tube casts were found on two occasions, and sugar was present once or twice in small quantity. At first no peculiarity was observed as to the albuminuria, and so it was of course believed to be constant, and regarded as a result of renal disease due to diphtheria. It was only after some considerable time that it was discovered that the urine passed on getting up in the morning, and also that passed during the night, contained no albumen. This fact was noticed the first time the urine of these periods of the day was separately tested, and from inquiry I find that, although the peculiar periodicity was only then observed, it may have existed from the first, and I think the history and progress of the case make it most probable, in fact almost certain, that it did so. I have said that

¹ British Medical Journal, September 24, 1881, p. 522.

traces of sugar were sometimes discovered in the early period of the illness. No trace of it has ever been detected since the patient came under my care, nor have there been any casts. In a specimen passed on rising, however, we found for the first time a well-marked layer of oxalates deposited on the top of the mucus, and under the microscope octahedral crystals of oxalate of lime were seen in very large numbers. Curiously, in another specimen passed an hour later, there was not a single oxalate crystal; the urine had become alkaline, and there was a pretty copious deposit of triple phosphates.

This patient has now been for a considerable time under my observation, and I can give some interesting details as to the features of her albuminuria and as to some experiments which we have made regarding it. I have already pointed out that the urine passed on rising—and the same has been true, except on one or two occasions, of that passed during the night—contains no albumen or only the merest trace. Now while she is up the albumen is constant, though once or twice toward evening the quantity has been small. But facts as to the daily cycle of the albuminuria are, that the quantity is, as a rule, largest in the morning in the urine passed before breakfast. I have many times examined samples passed forty-five minutes after she got up and before she had taken any food, and have found the albumen in them to be very copious. It would appear, therefore, that the moment she gets up there is a sudden onset of albuminuria, so that this case forms, in this respect, an interesting parallel to that which I have described in the dietetic group, in respect to suddenness of onset, although due to a different cause. During the forenoon the albumen has several times been observed to become distinctly diminished in amount. Sometimes, though not so often, it is in largest quantity later in the day—*e. g.*, during the afternoon or the earlier part of the evening.

I have further tested the conditions of the albuminuria by experiment. On one occasion she remained in bed a whole day and two nights—about thirty-six consecutive hours, keeping her ordinary diet during the time. The result was that the albumen scarcely appeared. Indeed, there was in only one of the samples passed during that period anything more than a mere trace, and in that sample the quantity was small. Curiously, in the urine passed that night after she had been all day in bed, albumen appeared in small quantity. In that passed in the morning there was a mere trace. She then got up and in the urine passed forty-five minutes after, the albumen was found to be present in large quantity,—distinctly larger than it had usually been before. It was again present in small quantity the following night, and there was a distinct trace on rising the next morning. After that, the former cycle became reestablished. Thus the rest in bed, though it greatly diminished, did not entirely prevent the albuminuria; and it was followed by

an increased elimination of albumen when she got up, and a disturbance of the ordinary diurnal cycle. A corresponding result was elicited upon another occasion when the same experiment was tried.

On another occasion an experiment of an opposite kind was made. She was asked to rise at 5 A.M., dress and walk about the house for three-quarters of an hour. The urine passed on rising was free from albumen, whereas that passed forty-five minutes later contained abundance of it. She then lay in bed till 7 A.M. and the urine passed at that time contained no albumen or only a mere trace. She got up, and by 7.45 the albumen was again abundant.

On another morning she was asked to lie in bed and to move about the arms and legs, thus taking exercise in the recumbent posture. This she did for twenty minutes, and the astonishing result was that the urine passed after the time of exertion was, like that passed before it, perfectly free from albumen.

The next morning she was subjected for twenty minutes to very efficient massage in bed, but neither before nor after it did albumen appear.

A warm bath proved equally inoperative. Experiments were also tried with different kinds of diet, and they turned out to have very little effect. She was fed for several days exclusively on milk. It had a marked diuretic effect, and so, the urine being increased, the albumen seemed diminished, but the diminution was merely relative, not absolute. The subsequent addition of an egg daily and some bread and butter to the diet did not produce any evident increase in the albumen. Nor did it increase when ordinary or even rich diet was prescribed.

I have put in a tabular form, on the next page, the most important points connected with the urine in this case. The first table shows the patient's usual cycle, the second the cycle as influenced by experiment. From these experiments it is obvious that the change from the recumbent to the erect posture is at least the main factor in the production of the albuminuria, remarkable as that may appear. Diet has only a very slight effect, and the condition contrasts strikingly with that seen in the dietetic case which I have described. This case also differs from most if not all the so-called cyclic cases which I have seen recorded, in respect to the suddenness of the onset of the albuminuria. In them it commenced, as a rule, gradually and increased during the earlier part of the day, then gradually diminishing toward night, flowing and ebbing like the quiet tide, whereas in our case, though the diminution is gradual, the onset is sudden and abrupt like the tidal wave which is seen in certain rivers.

I have now related most of the facts of the case and will next discuss the question, What is the nature of the albuminuria from which she suffers? Is this young lady affected with, as was at first assumed, a

TABLE I.—REPORT OF EXAMINATIONS OF URINE IN CASE OF ALBUMINURIA FROM EXERCISE, BEGINNING WITH JUNE 20TH.

	Specific gravity.	Reaction.	Albumen Quantitative estimation by Dr. Oliver's percentage method.	Percentage of bile salts normal = 100 per cent.	Urea in grains.
June 20th.					
7.45 A. M.	1023	Distinctly acid.	Trace.	240 or 200	110.6316
8.50 A. M. Before breakfast .	1013	Faintly alkaline.	0.133 per cent.	300+	2.757
10.30 A. M. An hour after breakfast.	(Below average.)	Slightly alkaline.	Less than 0.05 per cent.	300	17.89426
6.30 P. M. After dinner and tea	1029	Faintly acid.	0.13 per cent.	240	38.67
9 P. M. Going to bed . . .	1026	Decidedly acid.	0.06 per cent.	150	66.102
Total					236.0548
June 21st.					
Night	1011	Distinctly acid.	Trace.	100	58.93674
7 A. M.	1016.5	Acid.	Very slight trace.	166	64.8
10 30 A. M.	1017	Very faintly acid.	0.24 per cent.	300	24.25

Neither sugar, peptones, nor bile pigment present in any of the specimens.

TABLE II.—URINE, BEFORE, DURING, AND AFTER THE EXPERIMENT OF RISING AT 5 P. M., GOING TO BED AGAIN AT 5.45, AND RISING AGAIN AT 7 A. M.

	Specific gravity.	Reaction.	Albumen. Quantitative estimation by Dr. Oliver's percentage method.	Percentage of bile salts normal = 100 per cent.	Urea in grains.
June 22d.					
9 P. M.	1027	Acid.	0.08 per cent.	240	69.267
June 23d.					
Night	1020	Slightly acid.	Faint trace.	166 or less.	72.5933
5 A. M.	1019	Acid.	Almost imperceptible.	166	29.388
5.45 A. M. Arose at 5 A. M. .	?	Acid.	0.05 per cent.	300	5.6038
7 A. M. In bed since 5.45 .	1013	Acid.	Scarcely perceptible.	240 or 200	17.04713
7.45 A. M. Up since 7 A. M. .	1009	Neutral.	0.06 per cent.	183 (?)	4.4361
2.30 P. M.	1023	Slightly acid.	0.3 per cent.	200	41.40092
9 P. M. Going to bed . . .	1027	Strongly acid.	0.16 per cent.	183	81.13725
Total					251.60650
June 29th.					
Night	1012	Acid.	Faint trace.	150	99.2715
7 A. M.	1024	Acid.	Very faint trace.	240 or 200	36.1269
7.45 A. M. Still in bed, before breakfast.	1024	Acid.	Very faint trace.	300	6.6111

No sugar, peptones, or bile pigment in any of the specimens.

hopeless chronic Bright's disease which must almost inevitably send her to her grave before she is twenty, or has she merely an unimportant albuminuria without organic disease, which may, perhaps, disappear when she gets past her present critical period of life, and at all events gives no ground for anxiety? From a careful study of the case, I am convinced that the latter is the correct diagnosis. The grounds upon which I have formed this opinion are:

1st. That there is a period in every day in which the urine is free from albumen;

2d. That the quantity of urine and of urea is normal;

3d. That except on two occasions no tube casts have ever been found; and,

4th. That there is no symptom except the albuminuria at all fitted to suggest the idea of organic renal disease.

I shall now recur to the case of the gentleman regarding whom I have already given some details. The patient is between twenty and thirty and has travelled very extensively, riding and walking a great deal. The earliest symptom of which he complained was a painful uneasiness in the calves of his legs. The most careful examination afforded no evidence of disease in any part of the body, some degree of dilatation of the stomach and the abnormality of the urine alone excepted. On June 5, 1885, I examined six specimens of his water. At 7.30 P.M. the albumen was copious; at 8.50 it was very distinct; at 9.30 A.M. there was a trace; at 10.30 it was distinct; at 12.30, copious. There were no tube casts and the amount of urea was normal. A few days later, after he had recovered from the fatigue of a long journey, I found at 1.50, 3.40, and 5.45 P.M. no albumen; at 7.30 a trace; at 8.30 A.M. a very slight trace; at 10 A.M. a slight trace. I have already pointed out that diet even of a rich, varied, and ill-chosen sort produced no albuminuria. On the other hand, walking, especially walking up hill, induced the symptom. He lived in a hotel in Princes Street and could walk to Charlotte Square with little or no effect on the urine, but if he took a walk to the Calton Hill, the Castle, or Arthur's Seat, the albumen became copious. With rest it gradually disappeared. Carriage exercise seemed to produce no unfavorable effects. Massage, which had been very carefully tried, being thoroughly carried out for forty or fifty minutes by a most competent rubber, was also without result. I tried the effect of exercise in a sitting posture. He sat in his chair and played the banjo for an hour and then used his dumb-bell fifteen minutes. The urine passed immediately afterward was normal, but that voided half an hour later contained albumen. I did not think of trying the effect of muscular movement when he was lying on his back. It was however abundantly clear that muscular exertion, and particularly active walking exercise, was the chief exciting cause in this case also. I need

not again go over the reasons which led me in this case also to give a favorable opinion.

As to the origin of the symptom, it is worth noting that in his travels he once walked through Asia Minor in a wonderfully short space of time, and it was during or after this feat that the albuminuria was first observed. It is very probable that the great strain on his system which his feat implied was the starting-point of the albuminuria, which subsequently, when the damage had been done, could be induced by a much less amount of exertion.

Passing from the illustrative cases, I shall now direct attention to certain other points of interest:

1. The kind of albumen discharged has recently received some attention. Dr. Maguire¹ has recently published the results of investigations as to the forms of albumen met with in different diseases, and he concludes that the less grave the case the greater is the amount of paraglobulin in proportion to the amount of serum albumen. In three cases of cyclic albuminuria he found that the albumen present entirely, or almost entirely, consisted of paraglobulin. In a case described as one of anæmia with albuminuria, due in all probability to fatty degeneration of the kidney, both serum albumen and paraglobulin were present, but the latter was in much greater quantity than the former, while in Bright's disease the proportion of these two substances was reversed. On examining very carefully into this question, in the case of the young lady, the serum albumen was found to be in greater quantity than the paraglobulin, and, as it was certainly functional, I cannot admit the universality of Dr. Maguire's conclusion.

2. Another observation as to the kind of albumen present has been made by Dr. Pavy. He finds that sometimes it is not ordinary serum albumen, but alkali-albumen. I am not in a position to confirm this statement from my own observations, but I have been struck with the facility and speed of formation of acid albumen, very slight quantities of acid sometimes preventing coagulation by heat.

3. No peptones, or any other body of that group, have been found in our case, and very little is said of them in cases recorded by others. I observe, however, that Dr. Oliver,² of Harrogate, has met with an instance of intermittent albuminuria, in which peptones replaced the albumen for a time.

4. My patient, though she had no distinct œdema, had a pale, puffy-looking face. This was, I believe, due partly to a general morbid condition of the vessel walls, and partly to the anæmia which often accompanies this affection.

¹ *Lancet*, June 5, 1886, p. 1062, and June 12, 1886, p. 1106.

² *Articles in Lancet*, 1885, vol. i.

5. Occasionally sugar is found. It was detected early in the illness by good observers in both the cases just described; and this fact, as will be seen, lends support to the hypothesis that faulty metabolism may have to do with the production of the albuminuria in such cases.

6. Other chemical changes also occur. Thus phosphates may be present in addition to, or alternately with, the albumen.

7. Urates are sometimes very abundant, and sometimes uric acid is present in considerable quantity.

8. The most common of all the additional chemical abnormalities is the presence of oxalates. They occur, at least occasionally, in a large proportion—I should say in the majority—of cases. It is found that ordinary oxaluria sometimes leads to temporary albuminuria and the presence of tube casts probably by irritating the renal tissues; but, in addition, it should be observed that oxalates very frequently appear in the course of the cases we are considering.

9. The bile salts have been found present in very considerable excess. In the case recorded by Dr. Oliver, to which I have already referred (which may, however, have belonged to the dietetic group), this was so. In the urine they have also been present in marked excess, and my friend, Dr. Stevens, who has devoted much attention to this subject, observed that there has been a diurnal cycle in their excretion corresponding, in the main, to the cyclic character of the albuminuria. This was very distinctly made out when the patient was on ordinary diet, and nothing was done to disturb, in any way, her daily routine of life. The urine passed at night usually contained little more than the small quantity which one expects to find in the urine of healthy individuals. In the urine passed on rising they were in excess, still more in that passed before breakfast, at which time the quantity sometimes reached its maximum for the twenty-four hours. The amount, as a rule, kept up during the day, and diminished toward evening. One interesting fact thus brought out is that the excretion of bile salts began to increase during the morning before rising, so that, whereas the albuminuria appeared to be due to exercise in the upright posture, and to be little influenced by anything else, the excretion of the bile salts was partly influenced by exercise, but partly dependent on some other factor. This is further shown by the circumstance that when she was kept in bed for thirty-six hours the diurnal cycle in their excretion continued to be observed. The appearance of albumen was accompanied by an increase in the quantity of bile salts present.

I may further state that a diurnal variation has been observed by Dr. Oliver¹ in the secretion of the bile salts in health, and his result may be broadly stated to be that the quantity increases during fasting

¹ *Lancet*, 1885, vol. I., and *Bedside Urine Testing*, third edition, p. 225.

and diminishes during digestion—falling rapidly after meals. But in this patient's case this is entirely altered. The night urine, during fasting, contains the smallest quantity of all. No doubt it increases toward morning, and still more when she rises before breakfast; but then the quantity keeps up during the day while digestion is going on, and only falls again toward night. A similar change was observed by Dr. Oliver.¹ He found that when albuminuria occurred after a meal the bile salts were excreted in increased quantity, whereas if at any time albuminuria did not occur after a meal the excretion of bile salts was within the normal range. It will be observed that Dr. Oliver found this change in the discharge both of albumen and of bile salts to stand in relation to the diet, whereas in our case it is related to exercise. The two cases are, therefore, not similar, the one being an albuminuria from exercise, the other, as stated by Dr. Oliver, being of hepatic origin. We have in this altered excretion of the bile salts an indication of some morbid change in the chemical or absorptive processes which I shall discuss later on.²

10. The presence of a normal amount of urea and the general absence of tube casts are specially worthy of our notice.

We have now to ask ourselves what explanation our present knowledge enables us to give the cases of this class. While it must be at once conceded that changes of a gross kind in the secreting renal tissues are not very probable, it might be held that molecular alterations of the cells in the Malpighian tufts dependent upon congenital pecu-

¹ Lancet, June 13, 1885, p. 1078.

² Until recently our only method of detecting the bile salts in the urine was that of Pettenkofer by sugar and sulphuric acid. This method, however, owing to the necessity of first extracting the bile salts from the urine, though it might be satisfactory in the hands of chemists, was impracticable as a clinical test. Dr. Oliver, of Harrogate, has devised a method free from this objection, and by which a quantitative estimate can be made. It depends on the fact that the bile salts precipitate albumen or peptone when the fluid is of the requisite degree of acidity, and the test is done in specially graduated tubes with a standard solution of peptone acidified to the proper degree by acetic acid. The solution is, however, difficult to prepare and, if much used, comes to be expensive. A simpler qualitative method, depending on the same property of the bile salts, but requiring no special reagent, has been devised by Dr. Stevens (Ettles Scholar for 1884, and at present one of my assistants, in the course of his clinical work as holder of the Stark Scholarship in Clinical Medicine). The urine, if not albuminous, must first have a little albumen added to it. An albuminous urine does very well for this—care being taken that one is selected which does not itself contain any excess of bile salts. A few ounces of albuminous urine can be carbolized and kept just like other test solutions for any length of time. If now the urine be poured into a conical glass and a little cold nitric acid be run carefully down the side, there will be, if bile salts are present in sufficient quantity, a precipitate of albumen at a certain level in the urine, separated by a clear area from the precipitate of albumen produced by the nitric acid. This upper precipitate of albumen is produced by the bile salts at the level at which the urine has become acidified to the proper degree. A slight reaction may occur even with the small quantity of bile salts present in normal urine and a similar faint precipitate may also be seen in healthy urine owing to the precipitate of mucin by the nitric acid. A little practice will, however, soon enable you to distinguish the slight precipitate which may occur in health from the well-marked and dense precipitate which appears when the bile salts are present in excess. It is, of course, necessary to avoid mistaking a precipitation of urates by the nitric acid for this reaction; should there be any doubt, the effect of heat will set it at rest. As the test is simple and easily done and requires no special reagent, it is well fitted for ordinary clinical work.

liarities might exist, permitting the transudation of albumen along with the water of the blood serum. But I am not aware of any sufficient evidence in favor of such a view, and the conditions under which the albumen appears seem susceptible of a better explanation. There are some considerations which favor the supposition that chemical changes in the serum may be the cause—namely, the occurrence of other morbid states of urine, such as glycosuria, phosphaturia, or oxaluria. Manifestly no change in blood pressure within the kidney or in the walls of the vessels, and probably no changes in renal epithelium could account for these, and it seems necessary to conclude either that the albuminuria and they are common manifestations of a faulty metabolism, or that, independently of alteration in the kidney inducing the one, we have alterations in the liver or other organs setting up the others. The other possible cause of the albuminuria, namely, vascular changes, seems to correspond most readily with the facts observed. The marked influence of muscular exercise and exercise of particular kinds and in particular postures does not seem readily explicable on the chemical hypothesis, while what we know of the physiology of the bloodvessels prepares us to believe that alterations of their lumina and of the blood pressure within them might readily be induced under such circumstances and result in the symptom in question. The occasional occurrence of glycosuria and the excess of bile salts might be advanced as difficulties in the way of this explanation, but it is easy to conceive that a general change in vascular activity which in the kidney induces albuminuria, might, in the liver, induce the other abnormalities. My judgment, therefore, leans toward this hypothesis, but I cannot give positive proof of its correctness.

As to the treatment of this class of cases, rest, judicious diet, and attention to the general health meet the principal indications; but I am anxious to give a careful and extended trial to such remedies as ergot and belladonna, which act upon the muscular fibres of the vessels, and shall not fail to do so as opportunity offers.

IV. I now proceed to consider much more briefly the fourth category of cases—those of *Simple Persistent Albuminuria*. I cannot speak so positively and definitely in regard to them, for on the one hand they are certainly rare, and on the other they are difficult to differentiate from examples of slight chronic organic renal disease; still our conception of this subject would be incomplete if we did not refer to them.

I can recall the case of a student whom I watched all through his University career. He looked quite healthy. No casts were ever found in his urine and the albuminuria was only accidentally discovered. He never had any bad symptom. He successfully went through the arduous work of a four years' course in medicine, which may be taken as a sufficient guarantee that, despite the albuminuria, his health was not

in any way seriously impaired. I cannot be certain that he had no intermissions, but I do not think he had.

I have at present under my care a gentleman, whose case probably is referable to this category. He has persistent slight albuminuria, none of the many specimens passed at all hours having ever been found free from albumen. But he has no tube casts and he discharges a normal quantity of urea. The albumen is scarcely influenced by diet or exercise, although, as is so often seen in all albuminurias, it is least abundant during the night and early morning. There is no distinct increase of vascular tension and no cardiac hypertrophy or other consequent complication of renal change. The only competing diagnosis is slight irritation of the urinary tract, due to an old gonorrhœa from which he formerly suffered. But as there is no positive evidence of this, I incline to think that a simple persistent albuminuria is the most likely cause.

The features of this kind of case I take to be persistent presence of albumen, usually in small quantity, unattended by tube casts, diminution of urea, by increased vascular tension, cardiac hypertrophy or other consequence of renal malady, persisting for a period of months or years and little influenced by diet or exercise. I cannot say whether further experience will confirm this view or not.

The last question which occurs in regard to these cases is as to prognosis. Are these different forms likely to continue simple, or do they culminate in organic renal disease? I think that in the first category there is a slight tendency to this latter issue. In the second and third categories it is less likely. From what has been said by such eminent authorities as Dr. George Johnson,¹ and Dr. Clement Dukes,² we cannot but fear that the condition does sometimes culminate in organic disease, but so considerable a proportion of my cases have gone on for long periods without doing so, that I am confident that it must be rare.

Dr. George Johnson has seen several cases in which, beginning with the simple affection, Bright's disease has developed. He mentions the case of a distinguished London physician, in whom at first albumen only appeared occasionally after walking exercise, and then was present in large amount, while diet had no apparent influence. After a time the albuminuria became persistent, and in the end fatal uræmia resulted. It is, of course, possible, that this was an example of cirrhotic Bright from the first, but when a contrary opinion is held by Dr. Johnson who saw the case, we are bound to conclude that the evidence was strong. Dr. Clement Dukes concludes that many cases are without doubt only transient, that probably many persist for years and yet recover, but he

¹ Dr. George Johnson, *British Medical Journal*, December 13, 1879, pp. 928-930.

² Dr. Clement Dukes, *British Medical Journal*, November 30, 1878, p. 794, and *Idem*, 1881, vol. 2, p. 776.

believes that a large proportion are simply the first stage of Bright's disease.

It must not be forgotten that I have found in some cases of cirrhotic Bright's disease the urine generally free from albumen, that abnormality occurring only when the patient has taken alcohol to excess, has been chilled, or over-fatigued with travelling. But in such cases vascular and cardiac changes, and very probably alterations in the retina will be found, which give conclusive proof of the existence of cirrhosis. Neither must it be forgotten that cases of cirrhosis may show no albumen in specimens passed during the night or in the early morning, while in the day and evening urines it is distinct enough.

The distinguishing features upon which I would insist are the quantity of urea, the presence or absence of tube casts, and the condition of the pulse and heart. These will indicate whether simple albuminuria or organic disease is present, and if these indications are favorable I should give a hopeful prognosis.

The fourth category is one in which my prognosis would be less hopeful. Still, so long as the solids are in the normal quantity, and the vascular changes do not manifest themselves, we may speak hopefully even in such cases.

AN EXPERIMENTAL STUDY OF MYCOTIC- OR MALIGNANT ULCERATIVE ENDOCARDITIS,

FROM THE LABORATORY OF
THE ALUMNI ASSOCIATION OF THE COLLEGE OF PHYSICIANS AND SURGEONS,
NEW YORK.

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It is convenient to group the inflammatory lesions of the endocardium into two classes—first, those in which the more prominent and constant character is the new formation of connective tissue, either in or upon the valves and general endocardium. This form of lesion may be designated by the name of *simple endocarditis*. Several varieties of this lesion may be recognized on the basis of their morphological characters. Thus the valves or the general endocardium may be simply thickened or sclerosed by a new formation of connective tissue, in a manner analogous to the interstitial production of new connective tissue so frequently seen in various internal organs. Or, either with or without a simple sclerosis, there may be irregular thickenings of, or distinct outgrowths from, the